

**Homework #1**

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1. A  $6 \times 6$  grid contains 36 squares and so may be tiled by 18 dominos in many different ways. Prove that it is impossible to find a tiling such that 9 of the dominos are vertical and 9 of them are horizontal.

*Hint:* Color the grid but not as a checkerboard. Color the even rows black and the odd rows white.

2. Twenty-five bugs are sitting on a  $5 \times 5$  checkerboard - each on a different square. At the sound of a gong each bug walks to an adjacent square (horizontally or vertically). Is it possible for each bug to again be on different square?